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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER

THAI, LUAN C

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 03/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/788,075

Applicant(s)

WACHTLER ET AL.

Examiner

Luan Thai

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6 is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office action is responsive to the amendment filed December 31, 2002.

Claims **1-25** are pending in this application.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) The invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 23-24, are rejected under 35 U.S.C. 102(b) as being anticipated by Maruyama et al. (4,199,777), as set forth in the previous Office Action paper Number 7 and now repeated.

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 1 and 23-24, Maruyama et al. (figures 1-8, specifically see figures 2-4-8) disclose a device comprising: a package having a cavity (2-9-32-33) therein; a semiconductor device (A-5-11-28-29) in the cavity. Since the semiconductor device appears to comprise light emitting elements (Col. 1, lines 29+, Col. 3, lines 50+, lines 60+, Col. 4, lines 5+, Col. 5, lines 40+), the claimed

of "the device having at least one optical receiver and/or transmitter" is taken to be inherent in Maruyama et al.'s semiconductor device. Maruyama et al. further disclose a thin film overlay (13) electrically connecting bond pads (10) on the semiconductor device 11 to electrically conductive pads 14 (see figures 4f-4g) on a layer of the thin film overlay (13) facing away from the semiconductor device 11; and more than one semiconductor device can be formed within the package (see figures 2 and 8).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 5, 8-17, and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marcinkiewicz et al. (5,422,513), as set forth in the previous Office Action paper Number 7 and now repeated.

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 1, 8-17, and 21-25, Marcinkiewicz et al. (figures 1-7, specifically see figures 4 and 7) disclose a device comprising: a package (10) having a cavity (11-14) therein; a semiconductor device (24-16a-16b) in the cavity; a thin film overlay (19-20) electrically connecting bond pads (22) on the

semiconductor device to electrically conductive pads (26) on a layer of the thin film overlay facing away from the semiconductor device, wherein the dimensions of the cavity exceed the dimensions of the semiconductor device. Marcinkiewicz et al. further disclose the thin film overlay including a first dielectric layer 18 adjacent the semiconductor device, a first conductive layer 20 formed on the first dielectric layer, a second dielectric layer 18 formed on the first dielectric layer 18 and the first conductive layer 20, a second conductive layer 20 formed on the second dielectric layer 18, wherein the first and second conductive layers 20 are formed into first and second respective conductors which are pads and planes; vias (19) filled with conductive material from bond pads 22 of the semiconductor device through the dielectric layer (18) and to the respective conductors.

Marcinkiewicz et al. do not explicitly disclose at least one optical receiver and/or transmitter being adjacent a surface of the semiconductor device. However, Marcinkiewicz et al. do disclose that the semiconductor device may be an integrated circuit chip of any type (Col. 6, lines 28+) and that the invention can apply to optical devices (Col. 2, lines 21+). It would have been obvious for an optical device, which comprises an optical receiver or transmitter formed thereon, being used in Marcinkiewicz et al.'s package.

Regarding claim 5, Marcinkiewicz et al. further disclose a hole formed through the thin film overlay 26, which overlay on semiconductor device 16a-16b.

5. Claims 2-3 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marcinkiewicz et al. (5,422,513) in view of Nakabu et al. (4,544,989, applicant admitted prior art), as set forth in the previous Office Action paper Number 7 and now repeated.

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 2-3 and 18-20, the proposed device of Marcinkiewicz et al. discloses all the limitations of the claimed invention, as detailed above, except for solder balls attached to the last layer of respective conductors to be external terminals for the device.

Nakabu et al. while related to a similar high density interconnected structure design teach (see figures 1-6) solder balls 49 and polymer layer 47 attached to the last layer of conductors 44 of the thin film overlay of the package in order to form external terminals for the device package. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply Nakabu et al. teachings of solder balls to Marcinkiewicz et al.'s device in order to create external terminals for the device package.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marcinkiewicz et al. (5,422,513) in view of Eichelberger (5,144,747, applicant admitted prior art), as set forth in the previous Office Action paper Number 7 and now repeated.

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claim 4, the proposed device of Marcinkiewicz et al. discloses all the limitations of the claimed invention, as detailed above, except for the package comprising a heat slug.

Eichelberger while related to a similar package design teach a heat slug 184 (see figure 14) is added to the package in order to conduct the heat away from the package. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a heat slug, as taught by Eichelberger, to Marcinkiewicz et al.'s package in order to improve the heat dissipating of the package.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marcinkiewicz et al. (5,422,513) in view of Cole et al. (5,338,975), as set forth in the previous Office Action paper Number 7 and now repeated).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claim 7, the proposed device of Marcinkiewicz et al. discloses all the limitations of the claimed invention, as detailed above, except for an adhesive for attaching the device in the cavity. Using an adhesive layer to secure a chip on a substrate is conventional in semiconductor art as taught by Cole et al. (e.g., adhesive layer 15 in figures 1-5). It would have been obvious to

modify the device by using an adhesive layer to attach the semiconductor device in the cavity to secure device in the package and such modification would be within a general skill of a worker in the art.

Allowable Subject Matter

8. Claim 6 is allowed.
9. The following is a statement of reasons for the indication of allowable subject matter: the cited arts fail to teach or render obvious the hole being back filled with an optical quality material, especially when these limitations are considered within the specific combination claimed.

Response to Arguments

10. Applicant's arguments filed on December 31, 2002, regarding claims 1-5 and 7-25, have been fully considered but they are not persuasive. Specifically:
 - a) Applicant argues, at the first paragraph of page 3 of the Remarks, that Maruyama et al do not teach "a thin film overlay electrically connecting bond pads on the semiconductor device to electrically conductive pads on a layer of the thin film overlay facing away from the semiconductor device", as recited in claim 1. In response, the Examiner respectfully disagrees because such limitations are disclosed by Maruyama et al, specifically in figures 4f-4g, which show a thin film overlay (13) electrically connecting bond pads (10) on the

semiconductor device 11 to electrically conductive pads 14 on a layer of the thin film overlay (13) facing away from the semiconductor device 11.

b) Applicant argues, in page 5 of the Remarks, that Marcinkiewicz et al. is not available as a reference in this application because the invention as described and claimed was conceived with due diligence from a date prior to the filing date of Marcinkiewicz et al. up to the filing date of the subject application.

In response, the Examiner points out that Marcinkiewicz et al. reference is a continuation of Ser. No. 07/962,449, filed on October 16, 1992, the date prior to the priority date (October 26, 1992) of this application (see the copy of front page of Marcinkiewicz et al. reference, attached).

Conclusion

11. Applicant's amendment filed on December 31, 2002 has been fully considered but they are not persuasive. Therefore, **THIS ACTION IS MADE FINAL**. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is (703) 308-1211. The examiner can normally be reached on 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Luan Thai
March 11, 2003


DAVID L. TALBOTT
SUPERVISORY PATENT EXAM
TECHNOLOGY CENTER 2800